

## **Infection**

### **Cellulitis (Pearson pg. 566)**

Common bacterial skin infection that can spread quickly and become very serious

#### **★ Causes**

- Bacteria entering the skin
  - Bacteria is often Staphylococcus (staph infection)

#### **★ Symptoms**

- Skin redness
- Swelling
- Warmth
- Pain
- Blisters and purulent fluid
- Fever
- Swollen lymph nodes

#### **★ Symptoms of sepsis**

- High fever
- Low BP
- Shutdown of organs

#### **★ Diagnosis**

- Generally diagnosed by appearance of skin and presence of bacteria

#### **★ Medication Intervention/Education**

- Oral Antibiotics
  - Administered to prevent serious complications like periorbital cellulitis
  - Serious cases = systemic antibiotics and analgesics
    - Prevent sepsis
- Medication should start recovery in 48 hours
  - Therapy should continue for 10 days

#### **★ Non Pharmacologic Interventions**

- Raising the affected limb above heart

- Sterile saline dressings
  - Reduce edema and promote drainage

### ★ Patient Teaching

- Picking wounds or scratching bites = starting/worsening cellulitis
- Children should be monitored for rapidly growing bites/inflammation
  - 3 yo and >50 yo = most common to experience facial cellulitis
- Older adults with poor circulation, diabetes, weakened immune system
  - More likely to develop cellulitis
  - More likely to develop severe cellulitis
  - Sinus infections = turn in periorbital cellulitis
  - Examine limbs daily & and apply moisturizer to avoid breaks in skin
- Hand Hygiene
  - Wash hands regularly
  - Don't touch affected area
- Wound Care
  - Wash wound with soap and water daily
  - Clear away dead tissue and purulent drainage
  - Wash inside out/new to old
  - Apply antibiotic ointment and sterile bandages
  - Keep proper moisture on wound
  - Monitor size of wound
  - Report:
    - Spreading of infection 24-48 hours after starting treatment
    - Fever
    - Increased lethargy

### ★ Management of Care

- Administer prescribed antibiotics PO/IV on regularly scheduled routine
  - Prevent the risk of sepsis
- Provide warm compress 4x daily, elevate, rest

★ **Risk Factors**

- Overweight
- Weakened immune system
- Presence of skin diseases
  - Eczema/athlete's foot
- Swollen limbs
- Use of IV drugs
- Previous infections of cellulitis

**Pneumonia (ATI pg. 128)**

An infection in the lungs caused by microbes; Excess fluid in the lungs due to inflammation (bacterial, fungal or viral) leading to impaired gas exchange

**Droplet**

★ **Assessment/Manifestations**

- Weakness
- Chest discomfort (dyspnea)
- fever/chills
- Shortness of breath/difficulty breathing
- Short breath cycles
- Crackles, wheezing, coughing, dull chest percussions over areas of consolidation
  - Consolidation = lobar pneumonia
- Purulent, blood tinged sputum (may not always be present)
- **Diagnostics**
  - Sputum Test:
    - Obtain b4 antibiotic therapy
    - Suction out mucus if needed
    - Early morning
  - CBC:

- Elevated WBC

- ABG:

- Hypoxemia (decreased PaO<sub>2</sub> <80 mm Hg)

- Chest X-ray

- Shows consolidation (solidifying of lung tissue)

★ **Promotion, Prevention and Teaching**

- Wash hands regularly
- Avoid crowded spaces
- **Smoking cessation**
- Obtain flu and pneumonia immunizations
  - Pneumonia yearly after 50
- Treatment and recovery can take a **long time**
- Suck on hard candies to moisten mouth and increase fluids
- Report black, tarry stools
- Take meds with food

★ **Nursing Care**

- High Fowler's (90 degrees)
- Increase coughing, suction, breathing treatment, oxygen and medications
  - Turn, cough, deep breathe
- Increase fluids and nutrition
  - 2 - 3 L on liquids daily
    - Thins secretion, prevents dehydration
- Oxygen as ordered
- Incentive spirometer
  - 10x hourly

★ **Medication Interventions and Education**

- Antibiotics
  - Penicillins/Cephalosporins (usually IV)

- Obtain cultures BEFORE giving first dose
- Monitor kidney function
  - Especially older adults taking these medications
- Take with food
- Bronchodilators
  - Reduces spasms and reduces irritation
    - Like albuterol, ipratropium, theophylline
      - Monitor theophylline (small TI range)
  - Provides rapid relief, increases bronchodilation, decreases secretions
    - Adverse effects:
      - Theophylline: tachycardia, nausea and diarrhea
      - Albuterol: tremors and tachycardia
      - Ipratropium: DRY DRY DRY, blurred vision, palpitations and headache (can indicate toxicity)
- Anti-Inflammatories
  - Glucocorticosteroids such as fluticasone and prednisone to reduce inflammation
    - Monitor:
      - Immunosuppression, fluid retention, hyperglycemia, hypokalemia and poor wound healing
        - Report mouth lesions (canker sores)

### Tuberculosis (ATI pg.143)

Infectious disease caused by Mycobacterium tuberculosis - airborne route

TB bacillus can lie dormant for years (latent TB) before producing disease as it becomes active when individual grows older or immunocompromised

Bacteria adheres to alveoli → triggers immune response with development of lesions in lungs → cough 3 weeks +, purulent/bloody sputum, unexplained weight loss, night sweats, lethargy

### ★ Diagnostics

○ Acid-fast bacilli smear and culture

- TB is confirmed by positive culture for *Mycobacterium tuberculosis*
- Three early-morning sputum samples
- Patient is considered non contagious when they have 3 - smears

○ Mantoux test

- Client will have + intradermal TB test within 2-10 weeks of exposure to TB
  - Test should be read within 24-72 hours of test
  - Findings include:
    - Palpable, raised, hardened area at insertion site (+ test)
    - Induration of 5 mm is considered + for immunocompromised patient
    - Induration of 10 mm is considered + for normal patients
- Those with latent TB can test +, and can receive treatment to prevent forming of active TB
- + test indicates client has development immune response to TB
  - Need chest x-ray or QuantiFERON test to determine presence of active TB infection
    - Will be + regardless of active/latent
- BCG vaccine = false positive test

○ Acid fast bacilli cultures

- Uses three early morning sputum samples
- Three negatives = negative/latent? (safe to be out in public)

○ Quantiferon Gold Test

○ Chest x ray

- Prescribed to detect active lesions in lungs

★ Nursing Care

- PPE:
  - N95 mask or powered air purifier when caring for patient with TB
  - Patient should be in negative airflow area

- Barrier protection
- Surgical mask on patient when transporting/leaving room
- Increase
  - Adequate nutrition
    - Foods with protein, iron, and vitamins C & B
  - Fluids
- Screen patient's family

★ **Medication Intervention and Teaching**

- Typical **four medication regimen**:
  - **300 mg Isoniazid**
    - Monitor for hepatotoxicity malaise, anorexia, fatigue and nausea) & neurotoxicity (tingling of hands and feet)
    - Vitamin B is encouraged to be prescribed with
    - Education: do NOT drink alcohol on this medication, take on empty stomach
  - **600 mg Rifampin**
    - Liver testing BEFORE taking medication
    - Monitor for hepatotoxicity
    - Education: pee can be orange, report pain/swelling of joints, use different contraceptive
  - **1500 mg Pyrazinamide**
    - Observe hepatotoxicity and nephrotoxicity
      - Liver enzyme testing every 2 weeks after starting medication
    - Education: glass of water with each dose, reduce gout and kidney problems, and avoid alcohol
  - **1200 mg Ethambutol**
    - Obtain baseline visual acuity tests + monthly after starting tx
    - Should not be given to children younger than 8 yrs

- Education: report change in vision immediately
- **Streptomycin (for multidrug resistance)**
  - High level of toxicity only use on TB (MDR-TB)
  - Do renal and output function tests
  - Monitor for ototoxicity
  - Education: Drink at least 2 L of fluids daily and notify provider if there are any changes in hearing
- **RIPE Orange = Rifampin, Isoniazid, Pyrazinamide, Ethambutol**
  - Orange = orange discoloration of secretions expected with rifampin

### ★ Client Safety and Teaching

- TB is often treated at home
- Medication therapy = 6-12 mo. of treatment, and up to 2 years of multidrug resistant TB
- Sputum testing every 2 - 4 weeks
  - 3 consecutive negative sputum tests are required to be considered TB negative (and be out in public)
- Practice proper hand hygiene
- While TB is active wear a mask in all public settings
- Complete full series of all medications to ensure bacteria becomes eliminated
- Get tested on regular basis if you live in busy area
- Risk Factors:
  - Immunocompromised status
  - Recent travel out of USA where TB is endemic
  - Any client with persistent dry cough, chest pain, weakness, weight loss, anorexia, hemoptysis, dyspnea, low-grade fever in the afternoon, night sweats, or chills GO GET TESTED

### Inflammation

**Gallbladder Disease: Cholelithiasis/Cholecystitis (ATI pg. 355)**



Cholecystitis is inflammation of the gallbladder wall **caused by gallstones** obstructing cystic or common bile ducts.

Cholelithiasis is the presence of stone in the gallbladder in relation to bile or cholesterol into stone.

★ **Assessment/Clinical Manifestations**

○ Risk Factors:

■ **Females**

- Estrogen therapies/contraceptives

■ **Cholelithiasis**

■ **Obesity**

- **High fat diet**

■ **Older adults**

- Rapid weight loss
- Native american or mexican american

○ Expected Findings:

- **Upper right quadrant pain:** sharp pain, often radiating to shoulder
- **Pain with deep inspiration** during right subcostal palpation (**Murphy's sign**)
- Intense pain with N/V
- Pain upon eating high-fat foods
- **Rebound tenderness** (**Blomberg's sign**)
- Dyspepsia, belching and fever

○ Physical assessment findings:

- **Jaundice, icterus, clay fatty stools, dark urine**
  - **From liver involvement**

○ Laboratory Tests:

- **WBC: Increased**, indicating inflammation
- Bilirubin: increased
  - If bile is obstructed

- Amylase/Lipase: increased with pancreatic involvement
- AST/ALT: Increased (with liver involvement)
- Diagnostic Procedures:
  - Ultrasound: shows gallstones and dilated common bile duct
  - Hepatobiliary scan (HIDA): assesses patency after contrast injection

## ★ Nutrition

- Dietary counseling:
  - Low-Fat diet:
    - Lower dairy use, fried food, chocolate, nuts and gravies
  - Avoid gas forming food:
    - Beans, cabbage, cauliflower and broccoli
  - Weight reduction
  - Vitamins:
    - Fat-soluble or bile salts that enhance absorption and aid digestion
      - A DECK of cards
      - Vit. A, D, E, & K are fat soluble

## Inflammatory Bowel Disease UC/Crohn's Disease (ATI pg. 347)

### ★ Assessment

- Risk Factors:
  - Genetics
  - Caucasian, Jewish and African
  - Young adulthood = females
  - Older adulthood = males
  - Tobacco use
- Findings:
  - Ulcerative Colitis - edema and chronic inflammation of mucosa in rectum and rectosigmoid colon; continuous ulcer forming

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- Abdomen pain/cramping (LLQ)
- anorexia/weight loss
  - electrolyte imbalance
- Fever, diarrhea, bloody/pus stool, high-pitched bowel sounds
  - 10-20 liquid stools daily
  - Anemia and dehydration
- Mucosa of colon can increase in blood flow and become edematous and reddened
- Crohn's - chronic inflammation and ulceration of entire GI tract, formation of patchy ulcerations, affects all layers of lining leading to fistulas
  - Chronic autoimmune disorder
  - Abdomen pain/cramping (RLQ)
  - Anorexia and weight loss
  - Anemia and fatigue
  - Fever, diarrhea (5 loose stools daily), steatorrhea\*\*
    - \*\*High fat content in stool
- Laboratory Findings:
  - UC
    - Hct/Hgb = decreased
    - ESR = increased
    - WBC = increased
    - CRP = increased
      - From chronic inflammation
    - Watch CBC
    - Albumin = decreased
    - K<sup>+</sup>, Na, Mg, Ca and Cl = decreased (dehydrated)
  - Crohn's
    - Hct/Hgb = decreased
    - ESR = increased

- WBC = increased
- Albumin = decreased
- CRP = increased
- K<sup>+</sup>, Mg, Ca = decreased (dehydrated)
- C-reactive protein: increased
- Folic acid and B12 = decreased

### ★ Diagnostic Procedures

- Magnetic resonance enterography:
  - Used with all IBD
  - NPO for 4-6 hrs leading up to test
- UC:
  - Sigmoidoscopy/colonoscopy
  - Barium enema: distinguish difference b/w UC and other diagnoses, ulcers in sigmoid colon
  - CT scan/MRI: presence of abscesses
  - Stool exam: parasites or microbes
- Crohn's:
  - Endoscopy
    - Proctosigmoidoscopy: identify inflamed tissue
    - Colonoscopy/sigmoidoscopy: rectum and large intestine
  - Ultrasound, xray, CT scan: bowel thickening
  - Barium enema: small intestine ulcers and narrowing

### ★ Surgical Interventions

- UC:
  - proctocolectomy with or without ileostomy
- Crohn's:
  - Laparoscopic strictureplasty
    - Increases diameter of bowel for strictures
  - Surgical repair of fistulas (perforations)

- Proctocolectomy
- Small bowel resection (colectomy and ileostomy)

★ Medication

- Sulfonamides: sulfasalazine
  - Nausea, fever, and rash
  - Take up to 2-4 weeks for therapeutic effects
  - Education: full glass of water after meals, increase fluid intake 2L/day, take folic acid supplement
- Corticosteroids: prednisone, hydrocortisone, budesonide
  - Monitor BP, electrolytes, and glucose
  - Avoid crowds and report evidence of infection
- Antidiarrheals

★ Nutrition

- Ulcerative Colitis and Crohn's Disease
  - Eat high-protein, high calories, low-fiber food
  - Avoid nicotine and substances that cause diarrhea
  - Avoid caffeine, alcohol, and lactose
  - Small frequent meals only
  - Take multivitamin that contains iron

**Peptic Ulcer Disease PUD (ATI pg. 327)**

Disorder NEED TO KNOW, erosion in the mucosa of stomach, asophagus, duodena.

★ Health Promotion and Prevention

- Alcohol in moderation
- Smoking/tobacco cessation
- Limit caffeine-containing beverages
- Stress management
- NSAID use control
- Balanced diet and exercise

★ **Assessment and Clinical Findings**

○ Risk Factors:

■ ***H. pylori* infection**

■ NSAID/steroid use

■ High stress

■ Genetics

■ O blood type

■ Excess alcohol use

■ Pernicious anemia

○ Expected findings:

■ Dyspepsia

● Heartburn, bloating, nausea, and vomit

■ Dull, gnawing pain/burning sensation on the back

■ **Gastric Ulcer Pain:**

● 30-60 min after a meal, worse in the day and eating

● Malnourishment

■ **Duodenal Ulcer Pain:**

● 1.5-3 hrs after meal

● During the NIGHT, feels better with eating

● Well-nourished

○ Physical Assessment Findings:

■ Pain and abdominal distension

■ **Bloody emesis and stools**

■ Weight loss

○ Laboratory Tests:

■ **H. pylori testing**

● Collected via endoscopy

■ **Urea breath testing**

● Exhales into collection container, **NPO prior to test**

- If **H. pylori is present carbon dioxide will be released**
- Stool samples

## ★ Diagnostics

- **Esophagogastroduodenoscopy (EGD)**
  - Definitive diagnosis of peptic ulcers
  - Monitor vitals until sedation wears off
  - NPO until return of gag reflex
  - NPO 6-8 hrs before exam

## ★ Medications

- **Antibiotics**
  - **2-3 combination of antibiotics**
    - **With H. pylori**
  - Complete full course
- Histamine-receptor antagonists
  - Ranitidine, famotidine, cimetidine, and nizatidine
    - Prevent stress ulcers who are NPO after surgery
  - Education: notify about coffee ground emesis/stool, complete all meds
- Proton-pump inhibitors
  - Pantoprazole, esomeprazole, omeprazole, lansoprazole and rabeprazole
    - **Suppress gastric acid** secretion
    - Insignificant adverse effects with SHORT term use
    - Fractures, pneumonia, C-diff, acid rebound with LONG term use
  - Education: do NOT crush or chew, **avoid alcohol and NSAIDs**
- Antacids
  - Mg Hydroxide
    - **Neutralize acid** in the gut
  - Education: can be given **7x daily, 1-2 hours apart from other meds**, take all of the medications
- **Mucosal Protectants**

■ Sucralfate

- Coats walls and protects actions of pepsin and acid
- Education: 1 hr before meals on empty stomach, monitor for constipation, if taking bismuth - stools can be black

★ Patient Care/Management

- Have client avoid foods that cause distress (coffee, tea and soda)
- Monitor change in vitals: BP down, HR AND RR up
  - Watch for hypovolemic shock
- Decrease stress
- Encourage rest
- Encourage smoking/alcohol cessation
- Monitor labs
- Treatment of perforation is emergency surgery
  - Washout of the abdomen, lavage
    - Need a wound vac

★ Nutrition

- Avoid spicy foods, gas forming foods, and alcohol
- High fiber foods
  - Oats, legumes, barley
- Vitamin A, probiotics and teas
- Avoid coffee and alcohol

Fluid and Electrolytes

Fluid Imbalances (deficit/excess) (ATI pg. 277)

★ Deficit Assessment Manifestations

- Deficit Risk Factors
  - Hypovolemia:
    - GI loss; vomit, diarrhea, suctioning
    - Excess skin loss; sweating without water/electrolyte replacement



- Diuretic therapy and adrenal insufficiency
- Burns
- Blood loss
- hyperventilation
- Dehydration:
  - hyperventilation/excess sweat without water replacement
  - Prolonged fever
  - Diabetic ketoacidosis
  - Diabetes insipidus & osmotic diuresis
  - Excess intake of salt, salt tablets or hypertonic IV fluids
- Findings
  - Hypovolemia
    - Vitals: hypothermia, tachycardia, thready pulse and low BP, ortho hypotension, increased RR, hypoxia
    - Neuro: dizzy, headache, weak, confused
    - Renal: oliguria
    - Other: no capillary refill, cool clammy skin, sunken eyeball, flat jugular veins
    - Thirsty

★ Excess Assessment Manifestations

- Risk Factors
  - Hypervolemia:
    - Heart failure, kidney disease, cirrhosis
    - Overdose fluids
    - Severe stress
    - Hyperaldosteronism
    - corticosteroids
  - Overhydration:
    - Water replacement WITHOUT electrolytes

- Excessive administration of IV D5W (hypotonic solutions)
- Expected Findings
  - Fluid Volume Excess:
    - “Everything up” HR, BP, RR, Central venous Pressure = Increased
    - Neuro: weak, vision change, paresthesia, seizures
    - GI: Ascites, hyper bowels, liver enlargement
    - RR: crackles, cough, dyspnea
    - PERIPHERAL EDEMA resulting in weight gain

### ★ Diagnostics

- **Deficit Labs: CONCENTRATED**
  - Hct: Increased (hypovolemia)
  - BUN: Increased (hemoconcentration)
  - Urine Specific Gravity: > 1.030
  - Blood Sodium: >145 (dehydration)
  - Blood Osmolality: > 295 (dehydration/hyponatremia)
- **Excess Labs: DILUTED**
  - Hct & Hgb: decreased
  - Blood osmolality: decreased
  - Urine Sodium and Specific gravity: decreased
  - BUN: decreased
- **Excess testing:**
  - X-ray
    - Reveals possible pulmonary congestion

### ★ Pharmacologic Therapy

- Deficit:
  - Fluid IV replacement therapy
  - Drink 2-3 L of fluids daily
  - Provide oxygen if needed
- Excess:

- Restrict fluid intake
- Consume low sodium diet
  - Diary on how much sodium is consumed daily
  - Review OTC medications for sodium
- Diuretics

## ★ Care Management

- Deficit
  - Monitor vitals, LOC, gait & stability
  - Encourage change in positions regularly, but move slow
  - Hypovolemic shock:
    - Significant loss of body fluid
      - Admin O2
      - Monitor vitals q 15 minutes
      - Colloids:
        - Packed with RBCs, plasma, and synthetic plasma expanders
      - Crystalloids:
        - Lactated ringer's, normal saline
      - Give vasoconstrictors: dopamine, phenylephrine
      - Perform hemodynamic monitoring
    - Notify if urine output falls below 30mL/hr
- Excess
  - Daily weight and monitor I&O
  - Assess RR regularly
    - Watch for pulmonary edema and heart failure (complication)
  - Monitor edema
  - Position: semi fowler's or fowler's
  - Oxygen therapy

- Use pressure reducing mattress
  - Watch skin
- Notify provider if there is 1-3lb weight gain 24hr-1week period
- Restrict fluid intake

## Sodium, Potassium, Calcium and Magnesium Imbalances (Deficit/Excess) (ATI pg. 283)

### ★ Expected Ranges

- Sodium: 136 - 145
- Calcium: 9 - 10.5
- Potassium: 3.5 - 5
- Magnesium: 1.3 - 2.1
- Chloride: 98 - 106
- Phosphorus: 3 - 4.5

### ★ Assessment Deficit

- Sodium Deficit Risk Factors
  - Excess sweat
  - Diuretics
  - Hyperlipidemia
  - Low-sodium diet
  - Kidney disease
  - Heart failure
  - hypoglycemia
  - Wound drainage
  - UTI
- Sodium Deficit Expected Findings
  - Vitals: all up, hypotension, diminished peripheral pulses
  - Neuromusculoskeletal: headache, confused, lethargic, weak, seizures, DTR
  - Hyperactive bowel, motility, nausea, cramping, vomiting

○ **Potassium Deficit Risk Factor**

- Diuretics, corticosteroids, digitalis
- Increased secretion of aldosterone
- NPO status
- Kidney disease
- Cushing's syndrome
- Metabolic alkalosis
- Diaphoresis
- Nausea and vomiting
- Alkalosis
- Water intoxication

○ **Potassium Deficit Expected Findings**

- Vitals: low BP, weak pulse, ortho hypotension
- Neuro: altered mental status, anxiety, and lethargy leads to confusion and coma
- ECG: flat T wave, prominent U wave, ST depression, prolonged PR interval
- Dysrhythmias
- GI: low bowels, nausea, vomit, constipated, paralysis can develop (ileus)
- Muscular: weak/spasms, DTR can be reduced
- Shallow breathing

○ **Calcium Deficit Risk Factors**

- Not consuming enough Ca
- Vitamin D deficiency
- Wound drainage
- End-stage kidney disease
- Diarrhea
- Immobility
- Parathyroid removal/damage

- **Calcium Deficit Expected Findings**
  - Positive Chvostek's signs (facial twitching)
  - Hyperactive DTR
  - Paresthesia of hands and feet
  - Positive Trousseau's signs
  - GI: Hyperactive bowel sounds, cramps and diarrhea
- **Magnesium Deficit Risk Factors**
  - Celiac disease or Crohn's
  - Malnourished
  - Alcohol abuse
  - Vomiting and diarrhea
  - Heart failure/MI
  - Ethanol ingestion
  - Concurrent hypokalemia or hypocalcemia
  - Diuretics
- **Magnesium Deficit Expected Findings**
  - Cardio: increased BP, dysrhythmias, tachycardia, ECG changes
  - Neuromusculoskeletal: paresthesia, muscle tetany, seizures, Positive Chvostek's and Trousseau's
  - Depressed mood and agitation
  - Increased DVT

★ **Assessment Excess**

- **Sodium Excess Risk Factors**
  - Kidney failure
  - Cushing's
  - Water deprivation
  - Heat stroke

- Diabetes insipidus
  - Excess sweating
- **Sodium Excess Expected Findings**
  - Vitals: Thirst, Hyperthermia, Tachycardia, Orthostatic hypotension, restlessness
  - Neuro: seizure, coma, death
  - GI: vomit, anorexia, diarrhea
- **Potassium Excess Risk Factors**
  - Metabolic acidosis/DKA (diabetic ketoacidosis)
  - Chronically ill patients
  - Excessive K replacement
  - Kidney failure
  - RBC transfusions
  - Adrenal insufficiency
  - Older adults
  - Salt substitutes
- **Potassium Excess Expected Findings**
  - Vitals: slow irregular pulse and low BP
  - Neuro: restless, weak, paralysis and paresthesia
  - GI: diarrhea and hyperactive bowels and oliguria
    - Vomit
  - Dysrhythmias
- **Magnesium Excess Risk Factors**
  - Kidney disease/failure
  - Excess intake of antacids/laxatives
- **Magnesium Excess Expected Findings**
  - Hypotension
  - Lethargy
  - Muscle weakness

- Decreased deep tendon reflexes
- Respiratory/cardiac arrest

★ **Imbalance Pharmacological Interventions**

○ **Sodium Deficit**

- IV and foods high in Sodium
  - Beef broth and tomato juice
  - Replacement of sodium should not exceed 12 mEq/L in a 24 hour period

○ **Sodium Excess**

- Dextrose 5% in 0.45% Sodium Chloride (Hypertonic Solution)
- 0.3% Sodium Chloride (Hypotonic)
  - Preferred in severe cases
  - SLOWLY fix
- Dextrose in 5% Water and 0.9% Sodium Chloride (Isotonic/Normal Saline)
- Administer diuretics in patients with poor kidney excretion
  - furosemide
- Water intake not sodium, eat foods low in sodium

○ **Potassium Deficit**

- IV Potassium Supplements
  - Can cause phlebitis, mix with lidocaine to decrease pain
  - No IV bolus
  - 10 mEq/hr with concentration NO more than 1 mEq per 10 mL of solution
- Oral potassium medications
- Salt substitutes
- Foods high in K
  - Avocados, broccoli, milk, citrus, bananas, cantaloupe, potatoes

○ **Potassium Excess**



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- Loop diuretics
  - Furosemide
  - Insulin
    - Helps move insulin into ICF
    - Give dextrose to prevent hypoglycemia
- Albuterol
- Patiromer
  - Chronic hyperkalemia
- Sodium polystyrene sulfonate
  - Excretes K from body through the feces
- Administer IV fluids with Dextrose and Regular Insulin
- Administer Sodium bicarbonate to reverse acidosis
- **Calcium Deficit**
  - Vitamin D
    - Enhance absorption of Ca
  - Oral and IV Ca supplements
  - Encourage foods high in Ca
    - Dairy, leafy greens and canned salmon
  - Life threatening
    - Dextrose 5% and H2O Bolus IV
      - Too fast = cardiac arrest
- **Magnesium Deficit**
  - PO Magnesium Sulfate for mild cases
    - Can cause diarrhea and increased Mg depletion
  - IV Mg Sulfate for severe cases
    - Not to exceed 150 mg/min over 8 hours
  - Take food high in Mg
    - Dark green veggies, whole grains and peanut butter

- **Magnesium Excess**
  - Furosemide
  - Provide calcium
    - Reverses cardiac effects

★ **Diagnostics**

- **Hyponatremia**
  - Labs:
    - Blood Sodium: <135
    - Blood osmolarity: decreased
    - Urine Sodium: <20
    - Urine specific gravity: decreased
- **Hypernatremia**
  - Labs:
    - Blood Sodium: >145
    - Blood osmolarity: >300
    - Urine specific gravity: Increased
- **Hypokalemia**
  - Labs:
    - Blood K: <3.5
  - Diagnostic:
    - ECG: inverted, flat T waves, ST depression, U wave elevated
- **Hyperkalemia**
  - Labs:
    - Blood K: >5
    - Hgb & Hct:
      - Increased with dehydration and
      - Decreased with kidney failure
    - BUN & Creatinine: increased
    - ABG: metabolic acidosis

- pH < 7.35
- Diagnostic:
  - ECG: Peaked T wave, widened PR and QRS intervals, absent P wave, ST depression
- **Hypocalcemia**
  - Labs:
    - Ca: <9
  - Diagnostic:
    - ECG: prolonged QT and ST interval

★ **Patient Centered Care**

- **Hyponatremia**
  - If they can tolerate PO meds, then they should take foods high in sodium
  - Education:
    - Weigh daily
    - Notify provider of 1-2 lb gain in 24 hrs
      - Or 3 lb gain in 1 week
    - Monitor vitals and LOC
- **Hypernatremia**
  - Monitor LOC, vitals and heart rhythm
  - Education:
    - Consume low sodium diet and OTC meds that contain sodium bicarbonate
    - Notify provider of 1-2 lb gain in 24 hrs
      - Or 3 lb gain in 1 week
  - Implement seizure precautions
- **Hyperkalemia**
  - Prevent falls, assessing for cardiac changes
  - Monitor I&Os
  - Observe for GI manifestations

- **Hypokalemia**
  - Observe for shallow RR and diminished breath sounds
  - Monitor LOC, bowel sounds and oxygen saturation levels
  - Implement fall precautions for weakness
  - Watch for RR failure and cardiac arrest (complications)
- **Hypocalcemia**
  - Calcium gluconate or calcium chloride for life threatening manifestations
  - Avoid overstimulation
  - Have emergency equipment on standby
  - Implement seizure and fall precautions
- **Hypercalcemia**
  - 0.9% IV fluids
  - Calcitonin
    - “Tones down” amount of Ca in blood
  - Dialysis for severe cases
- **Hypomagnesemia**
  - Monitor DTR hourly during administration
  - Have calcium gluconate ready to reverse

## Immunity

### HIV/AIDs (ATI pg. 571)

#### ★ Assessment and Clinical Manifestations

- HIV Risk Factors:
  - Unprotected sex and multiple sex partners
  - Blood transfusions
  - IV drug use with contaminated needles
  - Occupational exposure
  - Can go undiagnosed in older adults b/c of flu-like s&s

■ Perinatal exposure

○ HIV Infection

- Occurs 2-4 weeks of infection

■ Similar to flu

- Fever, night sweats, chills, headache, rash, sore throat
- Anorexia, nausea, weight loss

■ Thrush

■ Lymphadenopathy (swollen lymph nodes)

■ STAGE 1:

- Non defining conditions
- CD4+ T-Lymphocyte: < 500 cells/mm

■ STAGE 2:

- No defining conditions
- CD4+ T-Lymphocyte: < 200 - 499 cells/mm

■ **STAGE 3 (AIDS):** All people with AIDs have HIV...but not all people with HIV have AIDS

- Findings:
  - WBC decreased
  - Life-threatening opportunistic infections
  - END OF STAGE HIV
    - Untreated = death in 5 years
  - CD4+ T-Lymphocyte:< 200
    - Helper T cells
  - Chronic ulcers
  - Encephalopathy
  - Kaposi' sarcoma
  - Recurring Pneumonia
  - Wasting syndrome
  - Tuberculosis

- STAGE 4: unknown

### ★ Medications

- ART (antiretroviral Therapy) 3-4 HIV medications in combination with antiretroviral medications reduce resistance, adverse effects and dosages.
- Fusion Inhibitors: Enfuvirtide
  - Blocks fusion of HIV with host cell
- Entry Inhibitors: Maraviroc
  - Prevents progression of infection
- Zidovudine
  - Stops RNA - DNA conversion
- Delavirdine & meds ending “-vir”
  - Stop replication
- Interleukin
  - Enhances immune response and reduces cancer cells
- Alternative therapy:
  - Vitamins, herbals and shark cartilage can help with manifestations

### ★ Management of Care

- Assess ALL risk factors
  - Safety, addiction, sex and drug use
- Monitor fluid/electrolyte and nutrition
- Assess skin and pain level
- Monitor vitals
  - ESPECIALLY temperature
  - CD4+ Count
- RR, confusion, dementia and vision changes should be watched
- Provide oxygen and analgesics as needed/prescribed

### ★ Client Safety Education

- Frequent hand hygiene
- Avoid crowded areas or traveling out of country

- Undercooked foods too
- Keep home clean, avoid sick people, friends and family
- Do not empty litter boxes
- Wash dishes in hot water
- Well-balanced diet
- Adhere to STRICT antiretroviral dosing
- Frequent follow-ups
- Identify signs of infection quickly and report

## Rheumatoid Arthritis

Autoimmune disorder where cells attack cells of the bone and causes inflammatory response and destruction of cartilage/bone.

### ★ Assessment

- Risk Factors
  - Female
  - 30 - 60 yrs old
  - Genetics
  - bacterial/viral infection
    - Epstein-Barr virus
  - Stress and smoking
- Findings
  - Pain at rest & movement
  - Pleuritic pain (pain at inspiration)
  - Fatigue, anorexia and weight loss
  - Paresthesias, fever, joint pain and weakness
  - Red sclera and enlarged swollen lymph nodes (lymphadenopathy)
  - SQ lumps under skin
  - Late:

- Swan neck and boutonniere deformities, bilateral and symmetrical swelling, warmth, deformed, and unable to complete ADL
- Ulnar drift (fingers bend towards pinky)

## ★ Pharmacological Interventions

### ○ NSAIDs

#### ■ Treatment starts here; pain, fever and anti-inflammatory effects

- Watch GI effects, watch kidneys

#### ■ Education:

- Take with food and routinely
- Observe for GI bleeding
- Avoid alcohol

### ○ Cox-2 blockers: Celecoxib

- Less GI but higher cardiac disease

### ○ Corticosteroids: Prednisone

#### ■ Strong anti-inflammatory for acute attacks

- Not for long term use

#### ■ Observe weight and blood pressure

#### ■ Education:

- Avoid crowds, follow prescription, look for change in vision, and glucose levels

### ○ DMARDs: Hydroxychloroquine, Mincycline, Etanercept, Infliximab, adalimumab,

### Methotrexate

#### ■ Monitor allergic rxns and low WBC count, platelets, and increased AST/ALT

#### • Education:

- No pregnancy, report hair loss, avoid alcohol

## ★ Diagnostics

### ○ Labs:

#### ■ Anti-CCP Antibodies



- Positive in RA: detects antibodies to cyclic citrullinated peptide (anti-CCP)

#### ■ Rheumatoid factor antibody

- Diagnostic level for RA is 1:40 to 1:60
  - High titers = severe disease
  - Other autoimmune diseases can increase RF count

#### ■ ESR

- Elevated ESR = inflammation/infection in body
  - 20 - 40 = mild inflammation
  - 40 - 70 = moderate
  - 70 - 150 = severe

#### ■ C-reactive protein (CRP)

- Can be done in place of ESR
- Great for diagnosing and monitoring disease
- Elevated levels = inflamed

#### ■ Antinuclear antibody titer (ANA)

- + test (increased) = RA
- Target Healthy tissue
  - Titer = normally 1:20 dilution

#### ■ WBCs

- Elevated = inflammatory response

#### ○ Diagnosing

##### ■ X-ray

- Determines degree of joint destruction
- Negates need for more expensive radiology tests

##### ■ MRI

##### ■ Arthrocentesis

- Aspirate synovial fluid from joint and test for ANA, WBC, etc.

## ★ Patient Care

- Maximize physical activity, minimize pain, and monitor skin
- Monitor for Sjogrens Syndrome (excessive dry eyes and mouth)
- Provide referrals to PT & OT
- Facilitate use of assistive devices for safety
- Watch medication effectiveness
- Nutrition:
  - Eat high vitamins, protein and iron
  - Eat small frequent meals
- Client education:
  - Morning stiff = hot shower, pain in hands = heated paraffin, edema = cold therapy
  - Use non pharmacologic therapies to help
    - Hypnosis, acupuncture, music, yoga and spiritual

### **Systemic Lupus Erythematosus (SLE)**

Autoimmune disorder, produces ANA, affects skin, lungs, kidney and heart.

Chronic inflammatory disorder of the connective tissue, leading to inflammation and tissue damage

### ★ **Assessment and Clinical Manifestations**

- Risk Factors
  - Females, 20 - 40 yrs old (onset)
  - African American, Asian, hispanic and Native descent
- Findings
  - Fatigue
  - Alopecia
  - Blurred vision
  - Anorexia/weight loss
  - Depression, pain (in the joints) and weakness

- Raynauds phenomena (vasospasms = decreased blood flow to extremities)

- Fever, anemia, pericarditis, butterfly rash

- With severe lupus; kidney, heart, lungs, GI and vasculature are affected

- Lymphadenopathy (enlarged lymph nodes)

## ★ Diagnostics

- Labs

- Skin Biopsy

- Used to diagnose DLE, looking for lupus cells and cellular inflamm.

- Immunogenic Testing:

- Diagnoses

- Antinuclear antibodies (ANA) produced against one's own

- DNA

- Positiver titers = 95%

- ESR elevated: systemic inflammation

- C3 & C4 (proteins that affect the immune system)

- Decreased; revealing depletion from Lupus

- BUN and Creatinine

- Increased (with kidney involvement)

- Urinalysis

- + for protein and RBCs (kidney involved lupus)

- CBC:

- Pancytopenia (RBC, WBC and platelets depleted)

## ★ Management of Care

- Assessment/Monitoring for:

- Vitals, pain, ROM

- High BP and edema

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- I&O
- Diminished breath sounds
- Rubor, pallor, cyanosis of hands and feet
- Changes in LOC, seizures and psychosis
- Provide small, frequent meals for anorexia
- Limit salt intake
- Provide emotional support and therapy for client/family

★ **Medications**

- NSAIDs
  - Reduce inflammation and pain
- Corticosteroids: Prednisone
  - Immunosuppression and inflammation
    - Watch retention, high BP and kidney function
    - Gradually taper
  - May receive topical cream for butterfly rash
- Immunosuppressant Agents: Methotrexate, Azathioprine and Belimumab
  - Suppress immune response
  - Stimulate B-cells, reducing autoimmune response
    - Avoid live vaccines 30 days before
- Antimalarial: hydroxychloroquine
  - Suppression of synovitis: fever, fatigue, decreases risk of skin lesion from UV light
  - Need frequent eye exams

★ **Client Teaching**

- Avoid UV and sun exposure
- Use steroid cream for rash
- Watch for renal failure
- Report peripheral/periorbital edema promptly
- Avoid drying agents on skin

- Use mild protein shampoo
- Frequent rest periods
  - Avoid harsh products
- Avoid sick people and take rest periods

### **Discoid Lupus Erythmatosus (DLE)**

Primarily affects the skin

### **Acid-Base and Oxygenation**

#### **Acid-Base Imbalance (ATI pg. 293)**

##### **★ ABG Interpretation**

- **Respiratory Acidosis: Hypoventilation**
  - Results from
    - RR depression from opioids, poisons and anesthetics
      - S&S: BP, HR initially high then REVERSES as it worsens
      - Pale & cyanotic = shallow breaths
      - Ppl with sleep apnea
    - Increased carbon Dioxide
  - S&S
    - Confusion
    - Lethargy
    - Dyspnea
    - Pale/cyanotic skin
  - Values:
    - pH: < 7.35
    - PaCO<sub>2</sub>: > 45 mmHg
    - HCO<sub>3</sub>: 22-26
- **Respiratory Alkalosis: Hyperventilation**

■ Results from

- Fear, anxiety, hypoxemia from shock (CNS response), high altitude

- S&S: RR up, deep RR, HR up

■ S&S

- SOB
- Dizziness
- Angine
- Parasthesia

■ Values

- pH: > 7.45
- PaCO<sub>2</sub>: < 35
- HCO<sub>3</sub>: 22-26

○ Metabolic Acidosis: hypoventilation

■ Results from

- Diabetic ketoacidosis, kidney disease, starvation, lactic acidosis\*, excessive intake of acids

- S&S: HP down, weak peripheral pulse, rapid deep RR, BP low, and headache, dysrhythmias

■ S&S

- Hypotension
- Tachycardia
- Weak pulses
- Dysrhythmias
- Kussmaul respirations
- Fruity odor or breath

■ Values:

- pH: < 7.35
- PaCO<sub>2</sub>: 35-45

- $\text{HCO}_3^-$ : < 22

- **Metabolic Alkalosis**

Treat underlying issue

- Results from

- Acid deficit and basic excess

- S&S: HR up, BP low, numb, tetany, depressed skeletal muscles causing ineffective breathing

- Acid overdose

- S&S

- Tachycardia
- Dysrhythmias
- Muscle weakness
- Lethargy

- Values:

- pH: > 7.45
- $\text{PaCO}_2$ : 35 - 45
- $\text{HCO}_3^-$ : >26 (28)

★ **Diseases Related to Imbalances**

- Respiratory Acidosis

- Guillain Barre
- Myasthenia Gravis
- Brain tumors and cerebral aneurysm
- Stroke
- Overhydration trauma
- Sleep apnea
- Obesity
- Pulmonary embolism and edema

- Respiratory Alkalosis

- Shock or early stage asthma/pneumonia

- Entero Cerebral trauma
- Salicylate toxicity
- Excessive mechanical ventilation
- Metabolic Acidosis
  - Diabetic ketoacidosis
    - Give IV fluids c insulin
  - Lactic acidosis
  - Liver, kidney, and pancreas failure
  - Seizure activity
  - Dehydration
- Metabolic Alkalosis
  - Cushing's syndrome
  - Hyperaldosteronism
  - GI suction
  - Nausea and vomiting
  - Antacid consumption

### ★ Management of Care

- Respiratory Acidosis
  - O2 therapy, ventilatory support, bronchodilators and mucolytics
  - Positioning and breathing techniques
  - Naloxone for opioid overdose
- Respiratory alkalosis
  - O2 therapy, anxiety reduction interventions
  - Rebreathing techniques
- Metabolic acidosis
  - Admin insulin if diabetic DKA (diabetic ketoacidosis)
  - Admin antidiarrheals and fluids if GI loss



- Admin sodium bicarbonate if blood bicarbonate is low
- Hemodialysis if client has kidney failure
- Metabolic Alkalosis
  - Admin antiemetic, fluid and electrolyte replacement if GI losses
    - Discontinue causing agent if related to K<sup>+</sup> depletion

## Asthma

### ★ Assessment and Clinical Manifestations

- Risk Factors:
  - Older adults
    - Susceptible to infections
    - Beta adrenergic receptors decrease w age
  - Genetics
  - smoking/2nd hand smoke
  - Allergies
  - Gerd\*
  - Exposure to chemicals and dust
- Findings:
  - Dyspnea, chest heightened ness
  - anxiety/stress
  - Wheezing, cough, mucous production
  - Barrel chest and use of accessory muscles to breathe
  - Prolonged exhalation

### ★ Diagnostics

- Labs:
  - ABGs:
    - Hypoxemia
      - PaO<sub>2</sub> less than 80 mmHg
    - Hypocarbica

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- Decreased PaCO<sub>2</sub> < 35 mmHg (early in attack)
  - Hypercarbia
    - Increased PaCO<sub>2</sub> > 45 mmHg (later in attack)
  - Sputum Culture
    - Indicated infection
- Diagnostics:
  - **Pulmonary function test**
    - Most accurate
    - Tests full inhale and exhale
      - Decrease in FEV1 by 15-20 below expected value = common in asthma clients
  - Chest X Ray
    - Diagnoses changes in chest structure over time

★ **Medications**

- Bronchodilators (inhalers): Albuterol
  - Rapid relief of acute asthma attack
    - Tremors and high HR
  - Take 30 min b4 exercise
- Anticholinergic: Ipratropium
  - Long acting, prevents bronchospasms
    - DRY DRY DRY
- Methylxanthines: Theophylline
  - Only for when others do not work (narrow TI)
    - Toxicity (Tachycardia, nausea and diarrhea)
- Long Acting B2 agonists: Salmeterol
  - Asthma attack prevention (long term, frequent use)
- Corticosteroids, Leukotriene antagonists, Mast cell Stabilizers & Monoclonal antibodies [fluticasone & prednisone, montelukast, cromolyn, omalizumab]
  - Treats Inflammation and used for prophylaxis

- Anaphylaxis, fluid retention, wt gain, decreased immunity/wound healing, hyperglycemia, canker sores

★ **Management of Care**

- High-fowlers - open lungs
- O2 therapy
- Monitor cardiac rate and rhythm for acute attack
- Remain calm and reassuring
- Provide rest periods for older adults

★ **Teaching**

- Identify and avoid triggers
- hard candies to relieve dry mouth
- Increase fluid intake
- Take prednisone with food
- Inhaler use\*\*
- Avoid all medications if you have respiratory infection
- Report black tarry stool or coffee ground emesis
- Use peak flow meter
  - Determines if airway is narrowing, even before symptoms emerge
  - Use three times, take highest number (not average)

**Chronic Obstructive Pulmonary Disease (COPD) (ATI pg. 137)**

Combination of emphysema and chronic bronchitis, this is irreversible.

★ **Assessment**

- Risk Factors
  - Older adults
  - Cigarette smoking
    - #1 risk factor
  - Alpha 1 - antitrypsin deficiency\*\*
  - Pollution

- Findings
  - Dyspnea, productive cough (most severe in mornings), hypoxemia
  - Crackles and wheezes
    - Hyperresonance when percussing
  - Barrel chest and hyperresonance on percussion (with emphysema\*)(due to trapped air)
  - Clubbing fingers/toes, pallor/cyanosis
    - Late stages
  - SPO2 in low 90s

### ★ Medications

- Same as Asthma\*\*\*
  - Bronchodilators and anti inflammation
    - Review teaching
- Mucolytics: Guaifenesin PO, Dextromethorphan (in combo), nebulizer treatments (acetylcysteine and dornase alfa)
  - Loosens secretions

### ★ Diagnoses

- PFTs
- Chest x-ray

### ★ Management of Care

- Upright or tripod position
- Same as asthma
- Stop smoking
- Deep breathing instead of spirometer
- Spirometer 10x an hour
- Encourage cough and suction to remove secretions
- O2 levels maintained between 88 - 92%
  - W/ 2-4 L of O2 NC
  - W/ 40% Venturi Mask

- Chronic COPD = less O<sub>2</sub> needed
- + expiratory pressure device
  - removes airway secretions by inhaling and exhaling
- Exercise conditioning
  - Improves pulmonary status by strengthening lung walls
    - 20 min daily walk 2-3x weekly, w/ rest periods
- Pursed lip breathing and diaphragmatic breathing
  - Pursed lip = in through nose and out through mouth

### ★ Nutrition

- Soft, high-calorie foods encouraged
  - Dyspnea decreases energy so they need to eat
  - Increased work of breathing, increases caloric demands
- Increase fiber and fluids
  - Thins secretions
  - Increase calories
- Proper nutrition = aiding prevention of infection
- Iron and vitamin E are good
  - Avoid gas forming foods
- Small, frequent meals

### ★ Complications

- Respiratory Infection
  - From increased mucus production and poor O<sub>2</sub> levels
    - Admin antibiotics, obtain influenza/pneumonia vaccine
  - Monitor: WBC, CRP and change in temperature
    - And decreased SAO<sub>2</sub>\*
- Right-sided heart failure
  - S&S: Low O<sub>2</sub> levels, cyanosis, JVD, dependent edema, and enlarged liver

- Monitor: RR, GI problems, HR and R, admin IV fluids and diuretics to maintain fluid balance

## Respiratory/Oxygen Care

### ★ Assessment

- Early Findings
  - Tachypnea and tachycardia
  - Restlessness
  - Pale skin and mucous membranes
  - High BP, RR distress
- Late Findings
  - Confusion/stupor
  - Cyanotic skin and mucous membranes
  - Bradypnea and bradycardia
  - Low BP and cardiac dysrhythmias

### ★ Interventions

#### ○ Nasal Cannula

- Safe, easy, comfortable and well tolerated
- FiO<sub>2</sub> of 24-44%
  - Flow rate 1-6 L/min
    - Provide humidity for 4+ L/min
    - Use water-soluble gel for dry nares

#### ○ Simple Face Mask

- FiO<sub>2</sub> 40 - 60%
  - Flow rate 5-8 L/min
- Flow rate < 5 L/min can cause rebreathing of CO<sub>2</sub>
- Poorly tolerated by clients with
  - anxiety/claustrophobia
- Use caution with high risk aspiration and airway obstruction

○ **Partial Rebreather Mask**

- **FiO<sub>2</sub> 40 - 75%**
  - **Flow rate 6-11 L/min**
- Reservoir bag attached w no valve
  - Allows rebreathing of  $\frac{1}{3}$  exhaled air along with room air
- Complete deflation when inspiring causes CO<sub>2</sub> build up\*
  - **Prevent deflation —> at risk for suffocation**

○ **Non-Rebreather Mask**

- **FiO<sub>2</sub> 80-90%**
  - **Flow rate 10 - 15 L/min**
- **Keep bag  $\frac{2}{3}$  full** during inspiration and expiration
- Delivers highest O<sub>2</sub> concentration possible
- **One way valve** allows maximum O<sub>2</sub> inhalation
  - **Prevents air room from entering mask and air they exhale**

○ **Venturi Mask**

- **FiO<sub>2</sub> 24-60%**
  - **Flow rate 4-12 L**
- Different sized adapters = specific amounts of air to mix with O<sub>2</sub>
- Delivers **most PRECISE** O<sub>2</sub> concentration
  - Best for chronic lung disease patients
  - **Provides high humidity**

○ **Aerosol Mask Face Tent and Tracheostomy**

- **FiO<sub>2</sub> 24-100%**
  - **Flow rate at Least 10 L/min (over 15 usually)**
  - **Provide high humidification**
- Use full for clients with **facial trauma, burns or thick secretions**

○ **T Piece**

- **FiO<sub>2</sub> 24-100%**
  - **Flow rate at least 10 L**

- Used for clients with laryngectomy, tracheostomy and endotracheal tubes
- High humidification required

★ **Management of Care**

- Semi Fowler's or Fowler's for breathing and chest expansion promotion
- Provide O2 therapy at lowest flow rate that will correct hypoxemia
- Assess skin integrity, RR, ABG, and Response to O2 therapy
- Specifics for RR distress
  - Fowler's
  - Focused RR assessment
  - Deep breathing and supplement O2
  - Stay with client, provide emotional support to decrease anxiety
  - Promote airway clearance
    - Coughing and suctioning

**Comfort, Tissue Integrity and Pain**

**Fibromyalgia and Chronic Fatigue Syndrome**

★ **Assessment**

- Risk Factors
  - Females: 30-50 yrs
  - Deep sleep deprivation
  - History of chronic fatigue syndrome, lyme disease, influenza like illness, trauma and rheumatologic conditions
    - Diagnosed when another painful diagnoses exists
- Findings
  - Severe chronic pain
  - Fatigue
    - Mild to severe fatigue lasting at least 6 months
  - Chest pain



- Dysrhythmias
- Sleep disturbances
- Abdominal pain
- GI disturbances
- Numbness and tingling
- Sensory sensitivity
- Debilitating muscle pain (unseen physically)
- Jaw pain
- Depression

### ★ Medications

- SNRI-Norepinephrine reuptake inhibitors SNRIs and Anti-convulsants:
  - Pregabalin: anticonvulsant
  - Duloxetine: SNRI
    - Together; increase serotonin or epinephrine in the body, and decrease nerve pain
    - Causes drowsy and sleepiness
    - Don't drink alcohol
- NSAIDs
  - Decrease inflammation and pain
- Tricyclic antidepressants
  - Amitriptyline
    - Confusion and ortho hypotension
  - Nortriptyline
    - Confusion and ortho hypotension
  - Trazodone
    - All Induce sleep and decreases pain

### ★ Education

- Limit caffeine, alcohol and other substances that interfere with sleep
- Develop sleep routine

- Engage in regular low impact exercise
- Use complementary and alternative therapy (CAM)
  - Herbs, acupuncture, etc
- PT or local support groups

★ **Evaluation**

- Decreased pain
- Increased sleep

**Tissue Integrity**

**Psoriasis and Dermatitis**

★ **Assessment**

- **Psoriasis**
  - Psoriasis Vulgaris
    - Reddened thickened area with silvery white scales
  - Exfoliative psoriasis
    - Erythema and scaling from severe inflammatory rxn
      - No obvious lesions
      - Can cause dehydration and hypo/hyperthermia
  - Palmoplantar pustulosis
    - Reddened hyperkeratotic areas
    - Plaques form and pustules turn brown, peel and form a crust (this is cyclic)
- Lesion Classing
  - Mild: less than 5% of Body Surface Area (BSA)
  - Moderate: 5-10% BSA
  - Severe: > 10% BSA
    - Physical findings:
      - Scales, bleeding, pitting, crumbling nails
- **Dermatitis**

- Nonspecific eczematous dermatitis:
  - Thickened red areas
  - Dry, moist or crusted appearance
  - Pruritus
  - Symmetrical on the body
- Contact dermatitis
  - From direct exposure to allergen, chemical or mechanical irritant
  - Well demarcated rash and localized
- Atopic dermatitis
  - Chronic rash
  - Caused by allergens or skin disease
  - Rash with scaling
  - Pruritus, severe
  - All over body and along skin folds

## ★ Medications

### ○ Topical Therapies

- Corticosteroids: triamcinolone, betamethasone
  - Reduce secondary inflammation
  - Watch skin thinning
  - Recommend warm, moist, occlusive dressings of plastic wrap

### ○ Tar preparations

- Coal tar and tars made from trees
  - Juniper, birch, and pine
    - Suppress cell division/proliferation and reduce inflammation
    - They can sting, burn, stain, and smell
      - photosensitivity

### ○ Vitamin D analogs: calcipotriene, calcitriol

- Prevent cellular proliferation

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- Regulate cell division
  - Limit sun exposure, monitor itching, monitor hypercalcemia, monitor for cancerous skin lesions and anorexia
- Vitamin A: tazarotene
  - Causes sloughing of skin cells
  - Contraindicated in pregnancy
  - Monitor for localized rxns, burning, inflammation and desquamation of the skin\*\*
    - Discontinue if becomes pregnant
- Systemic medications:
  - Cytotoxic: methotrexate, acitretin
    - Used for severe intractable cases
    - AST, ALT, BUN, creatinine
      - Watch toxicity, bleeding, bruising, fever
    - Can cause bone marrow suppression
  - Biologic: Adalimumab, etanercept, ustekinumab, alefacept, and infliximab
    - First line treatment
    - Moderate - severe psoriasis
    - Watch for latent TB and Hep B viruses
    - Inspect syringe for discoloration
    - Rotate injection sites
    - Protect med from light
    - Treatment is lifelong
    - Report signs of infection
    - Do NOT receive any live vaccines while taking the medication
  - Cyclosporine and azathioprine:
    - Immunosuppressant used when there are still lesions and other therapy does not work
  - Light Therapies

- **PUVA Therapy\***

- Psoralen photosensitizing medication (methotrexale) followed by UV A light to decrease proliferation
- Given 2-3x weekly
- Make sure client wears **eye protection and 24 hours after**

- **Narrow Band UV B Light therapy:**

- Used without medication, requires fewer treatments

- **Laser Light Therapy:**

- Mild-moderate psoriasis to target lesions directly and decrease exposure to surrounding skin

- **Antihistamines** (dermatitis);

- Diphenhydramine, cetirizine, fexofenadine
  - Relieve inflammation, redness, pruritus, and edema
  - **Avoid use of occlusive dressings or infection is present**
    - Watch retention
    - Causes lethargy, take at bedtime

- **Topical Immunosuppressants** (dermatitis); tacrolimus, pimecrolimus

- For eczematous dermatitis that has been **resistant to glucocorticoids**
- **Relieves inflammation**
- **Avoid if infection is present**
- **Stop when rash clears**
- Avoid direct sunlight

★ **Patient Management**

- Teach coping strategies
- Discuss comfort;
  - Baths with emollients, oatmeal baths, emollient creams
    - To soften scales
  - Do not scratch or pick lesions

- Dermatitis:
  - Avoid fabric softener
  - Wash skin thorough after irritant exposure
  - Apply cool, damp compress to rash
  - Use colloidal baths to relieve itching

## **Pain**

### **★ Assessment**

- **Risk Factors**
  - Cultural/societal attitudes
  - Lack of knowledge
  - Fear of addiction
  - Exaggerated fear of respiratory distress
    - Infants, children, older adults, clients w substance abuse disorder
      - Age
      - Cognitively impaired
      - Genetic sensitivity
      - Anxiety and fear
- Findings
  - Moaning, crying, and decreased attention span
  - Increased BP, RR, and pulse
  - Grimacing, wrinkled forehead

### **★ Medications**

- Non-opioid analgesics: acetaminophen
  - Mild to moderate pain
  - Prescribed following painful procedures
  - Ensure dose does not exceed 4g for clients 110kg +
- Opioid analgesics:
  - Tramadol, hydrocodone, codeine for **mild** pain

- Hydromorphone, morphine, fentanyl, oxycodone, or methadone for **severe** pain
  - S&S: NARCS-U
- Dose titrated upward progressively until client is relieved of pain
- Adjuvant analgesics
  - Enhance effects of non-opioids and alleviate manifestation that aggravate pain
  - Anticonvulsants
    - Carbamazepine
  - Antianxiety agents
    - Diazepam
  - Tricyclic antidepressants
    - Amitriptyline
  - Antihistamine
    - Hydroxyzine
  - Glucocorticoids
    - Dexamethasone
  - Antibiotics
    - Ondansetron
  - Anesthetics
    - Ketamine

★ **Management of Care**

- Set a pain-relief or comfort-function goal with client
- Determine need for scheduled analgesia
- Plan to premedicate before painful procedures
  - Wound care, repositioning, invasive diagnostic testing
  - Chronic pain
    - Admin long-acting or controlled release opioid analgesics
    - Admin around the clock, NOT PRN

- Refer to pain management center, palliative, or hospice to treat pain

### ★ Complications

- Undertreatment of pain can lead to increased anxiety w acute pain and depression w chronic pain
- Overdose
  - Sedation, respiratory depression, and coma
  - Stop opioid and give naloxone if RR is <8 or client is difficult to arouse

### Patient Controlled Analgesia (PCA) Pumps

Medication delivery system allowing clients to self-administer safe doses of opioids

### ★ Assessment

- Less time for patient to identify need and delivery of medication
  - Increased sense of control and decrease of amount of medication needed

### ★ Medications

- Morphine and hydromorphone

### ★ Teaching

- Client should let nurse know if pump does not control pain
- small , frequent dosing ensures consistent plasma levels

### ★ Complications

- Inadvertent overdosing
  - ONLY CLIENT should push PCA button



**Terms to Review:**

**Lactic Acidosis:**

- Body produces too much lactic acid to metabolize fast enough
- This is a medical emergency
- Yellowing skin/eyes, rapid breathing, tachycardia, weakness, cramping and diarrhea

**GERD:**

- Stomach acid repeatedly flows back through lining of esophagus
  - Heartburn, chest pain, coughing and vomiting

**Inhaler Teaching:**

- Shake inhaler, tightly hold inhaler in mouth, breathe in while pressing down and releasing powder, hold breath for 10 seconds, wait five minutes and repeat second dose
- Wash mouth out after use

**Alpha 1 - antitrypsin deficiency:**

- AAT is a protein that protects the lungs

**Emphysema:**

- Lung condition that causes shortness of breath
- Alveoli are damaged, over time the lung walls thin and weaken...possibly rupture

**SAO2:**

- Arterial Oxygen Saturation

**Pruritus:**

- Itchy skin derived from commonly dry skin

**Osteoarthritis vs RA**

- O: degenerative disorder
- RA: inflammatory disease from autoimmune deficiency

**Buttontip Deformities (RA)**

- Flexed finger tip, like a finger hump you can't straighten